



A.D. 1859, 21st *JANUARY*. N<sup>o</sup> 193.

S P E C I F I C A T I O N

OF

JAMES CHILDS.

—  
MANUFACTURE OF ARTIFICIAL GUMS,  
TEETH, &c.  
—

LONDON:

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1859.







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## Manufacture of Artificial Gums, Teeth, &c.

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**LETTERS PATENT** to James Childs, of Windsor House, Windsor Road, Putney, in the County of Surrey, for the Invention of “**AN IMPROVEMENT IN APPLYING HEAT IN THE MANUFACTURE OF ARTIFICIAL GUMS AND TEETH, AND OTHER ARTICLES COMPOSED OF INDIA-RUBBER OR GUTTA PERCHA COMBINED WITH SULPHUR.**”

Sealed the 28th June 1859, and dated the 21st January 1859.

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**PROVISIONAL SPECIFICATION** left by the said James Childs at the Office of the Commissioners of Patents, with his Petition, on the 21st January 1859.

I, JAMES CHILDS, of Windsor House, Windsor Road, Putney, in the County  
5 of Surrey, do hereby declare the nature of the Invention for “**AN IMPROVEMENT  
IN APPLYING HEAT IN THE MANUFACTURE OF ARTIFICIAL GUMS AND TEETH, AND  
OTHER ARTICLES COMPOSED OF INDIA-RUBBER OR GUTTA PERCHA COMBINED WITH  
SULPHUR,**” to be as follows :—

This Invention has for its object an improvement in applying heat in the  
10 manufacture of artificial gums and teeth and other articles composed of india-  
rubber or gutta percha combined with sulphur. When making artificial gums  
and teeth of a composition of india-rubber or gutta percha and sulphur, the  
moulded gums or teeth, or a combination of gums and teeth are secured  
between plaster of Paris casts or moulds of the mouth they are intended to fit,



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and in this state they are placed in a suitable vessel capable of being externally heated, and this I prefer to do by gas jets, though heat may be otherwise applied. The vessel (which is provided with a man-hole) is in connection with a steam boiler, so that it can be kept full of steam of low pressure, and such steam when in the vessel is then further heated up to the high degree of heat 5 requisite for producing the well known hardening effect consequent on high temperatures being applied to india-rubber and gutta percha when combined with sulphur. In like manner, other articles of india-rubber or gutta percha combined with sulphur may, when held in suitable moulds or forms, be introduced into a vessel, which is then filled with steam and heated externally. 10 In place of, or in addition to the steam being heated in the vessel in which the articles are placed, it may, after it leaves the boiler, be heated in its way to and before getting into the vessel. By thus employing steam of low pressure, and obtaining the requisite high temperature by surcharging the steam with heat, the process of "converting" india-rubber and gutta percha 15 combined with sulphur may be more safely and advantageously carried on.

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**SPECIFICATION** in pursuance of the conditions of the Letters Patent filed by the said James Childs in the Great Seal Patent Office on the 21st July 1859.

**TO ALL TO WHOM THESE PRESENTS SHALL COME, I, JAMES 20** CHILDS, of Windsor House, Windsor Road, Putney, in the County of Surrey, send greeting.

**WHEREAS** Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Twenty-first day of January, in the year of our Lord One thousand eight hundred and fifty-nine, in the twenty-second year of Her 25 reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Childs, Her special licence that I, the said James Childs, my executors, administrators, and assigns, or such others as I, the said James Childs, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the 30 term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "**AN IMPROVEMENT IN APPLYING HEAT IN THE MANUFACTURE OF ARTIFICIAL GUMS AND TEETH, AND OTHER ARTICLES COMPOSED OF INDIA-RUBBER OR GUTTA PERCHA COMBINED WITH SULPHUR,**" upon the 35 condition (amongst others) that I, the said James Childs, my executors or



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administrators, by an instrument in writing under my or their or one of their hands and seals, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar  
5 months next and immediately after the date of the said Letters Patent.

**NOW KNOW YE**, that I, the said James Childs, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say:—

10 This Invention has for its object an improvement in applying heat in the manufacture of artificial gums and teeth, and other articles composed of india-rubber or gutta percha combined with sulphur, and consists in applying for this purpose superheated steam, that is to say, steam of a higher temperature than is due to its pressure; by thus employing steam of low pressure,  
15 and obtaining the requisite high temperature by surcharging the steam with heat, the process of converting india-rubber and gutta percha combined with sulphur may be more safely and advantageously carried on. When making artificial gums and teeth of a composition of india-rubber or gutta percha and sulphur, the moulded gums or teeth, or a combination of gums and teeth, are  
20 secured between plaster of Paris casts or moulds of the mouth they are intended to fit, and in this state they are placed in a suitable vessel capable of being externally heated, and this I prefer to do by gas jets, though heat may be otherwise applied. The vessel (which is provided with a man-hole) is in connection with a steam boiler, so that it can be kept full of steam, and such  
25 steam when in the vessel is then further heated up to the high degree of heat requisite for producing the well known hardening effect consequent on high temperatures being applied to india-rubber and gutta percha when combined with sulphur. In like manner, other articles of india-rubber or gutta percha combined with sulphur may, when held in suitable moulds or forms, be introduced  
30 into a vessel, which is then filled with steam and heated externally. In place of or in addition to the steam being heated in the vessel in which the articles are placed, it may, after it leaves the boiler, be heated in its way to and before getting into the vessel.

Having thus stated the nature of my said Invention, I will proceed more  
35 fully to describe the manner of performing the same. It is well known that india-rubber and gutta percha, when mixed with sulphur in certain proportions and subjected to high temperatures, are rendered permanently elastic or converted into hard compounds, and such hard compounds have before been applied in the manufacture of artificial gums and teeth, and also in the making



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of a great variety of other articles, elastic or non-elastic as required, and various modes have before been resorted to for applying the heat to such articles requisite to produce the change which renders such compounds permanently elastic, or into a hard condition resembling horn or bone.

Amongst other methods of applying the requisite temperature to such compounds, saturated steam of very high pressure has been resorted to, the use of which is subject to considerable difficulty, and is dangerous. Now, according to my Invention, I employ steam of comparatively low pressure, which is, when out of contact with water, heated to the requisite high degree of temperature known to be necessary for converting articles made of the compounds above mentioned into the elastic or the hard or bone, or horn-like condition as may be required.

The Drawing shows a section of an apparatus suitable for the application of superheated steam, as above mentioned.  $a$  is a boiler or steam generator, which is supplied with water at the pipe  $b$  by a pump or other convenient means;  $c$  is a safety valve;  $d$  is a steam pipe to supply steam to the vessel  $e$ . The steam boiler is heated by gas jets from a gas supply pipe, on which is a cock to regulate the heat. The vessel  $e$  is also heated by gas jets from the gas supply pipe, as shown, which has a cock to regulate the quantity of gas passing to the jets under the vessel  $e$ . The vessel or apparatus  $e$  is provided with a tube  $f$  to contain a thermometer, so that the heat of the interior of the vessel may be observed and regulated to the degree requisite. The articles to be heated (usually contained in suitable moulds) are introduced into the vessel or apparatus  $e$  through the opening  $e^1$ , and they are placed on the false perforated bottom  $e^2$ , under which the steam pipe from the boiler  $a$  is introduced into the apparatus  $e$ , and such pipe is coiled and perforated with numerous small holes. The opening  $e^1$  is closed and the cover kept closely shut, as shown, or by other convenient means;  $e^3$  is a safety valve which I prefer to use, but it is not essential so long as the one on the boiler acts freely. The under part of the vessel  $e$  being heated as above explained, the steam will become further heated in this vessel, that is to say, to a temperature exceeding the natural temperature of the steam in the vessel  $a$ . The apparatus  $e$  may at its upper parts and sides be clothed over with non-conducting materials to prevent the escape of heat, and such is also the case in respect to the boiler;  $e^4$  is a cock to draw off any water resulting from the condensation of the steam.

I would remark, that the form or construction of the apparatus  $e$  may be varied, and it may be placed at a greater or less distance from the boiler or generator which may be used to supply steam thereto, and the steam may be



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heated as it passes from the boiler or generator, and before passing into the apparatus *e*, and in such manner, if desired, as not to require the vessel or apparatus *e* to be also heated, but I prefer the arrangement shown in the Drawing. I would also remark, that although a separate generator may be  
5 employed to ensure that the pressure of the steam should never exceed that which is perfectly safe, such separate generator may be dispensed with when using superheated steam according to my Invention. When I dispense with the use of a separate steam generator, then I introduce into the other vessel about as much water as will, when it is vaporized, fill the vessel with steam of  
10 a pressure such as I wish to employ, and I use a safety valve weighted to the desired pressure. By these means the vessel, when heat is applied thereto, will generate steam, and any excess will go off by the safety valve, and the remaining atmosphere of steam contained in the vessel will then become heated up to the high degree of heat desired, without so increasing the pressure as to  
15 be liable to injure the vessel.

Figure 2 is a longitudinal section of an apparatus suitable to be used in the manner above described. *a, a*, is an exterior cylinder of wrought iron resting on feet *a<sup>1</sup>, a<sup>1</sup>*; into the top of this cylinder a vessel *b* drops the flange at the top of this vessel resting on the edge of the cylinder *a*. The vessel *b* is fur-  
20 nished with a cover, which can be fastened down so as to make a steam-tight joint; *c* is a safety valve, and *d* a thermometer passing through the top of the vessel *b*; *e* is a gas burner for heating the vessel *b*; the supply of gas to the burner is regulated by suitable taps.

In place of heating the vessel with gas in this manner, other methods of  
25 applying heat may be resorted to, but I prefer gas, as it is most conveniently applied and regulated. It is preferred to make the vessel *b* of cast iron, as this material is not liable to be acted on to a prejudicial extent by the sulphuretted hydrogen liberated in the converting process. The articles to be converted, either enclosed in moulds or otherwise according to the nature of  
30 the articles, are placed in the vessel *b*, together with a small quantity of water, and the cover is fixed on, and the safety valve weighted to the pressure it is desired to apply; the gas is then lighted under the vessel *b*, and steam generated in the vessel. When the pressure of the steam is sufficient, it raises the safety valve *c*, and the steam continues to blow off till all the water is  
35 evaporated; when this is the case the valve closes, and the steam begins to be superheated. The thermometer should then be carefully observed as the temperature rises to the desired point, and there it is maintained by regulating the quantity of gas passing to the burner *e* by the taps on the gas pipe until the process is complete. In some cases, in place of putting an indefinite



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quantity of water into the vessel *b*, and allowing the surplus to blow off by the safety valve, I only place in the vessel exactly the quantity of water which is required; thus, if the capacity of the vessel *b* is one cubic foot, and I desire a pressure of about 15 lbs. per square inch above atmospheric pressure, I place two cubic inches of water in the vessel, and if I desire a pressure of 30 lbs., 5 I place three cubic inches of water in the vessel, and so on; the increase of pressure produced by the heat, after all the water is evaporated, is comparatively small. The pressure of steam in the vessel I prefer to keep at about ten to twenty pounds on the square inch, or a greater pressure may with advantage be employed if the articles to be converted are of large size, or a 10 very hard material be required: this, however, may be varied.

The compositions of india-rubber or gutta percha and sulphur may be such as have heretofore been employed, and the degree of heat employed, and the duration of the process will be the same as when saturated steam at a high pressure is employed, as has been common; the construction of the moulds, 15 when moulds are employed for containing the articles, will also be as heretofore.

In witness whereof, I, the said James Childs, have hereunto set my hand and seal, this Twenty-first day of July, in the year of our Lord One thousand eight hundred and fifty-nine.

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JA<sup>S</sup>. CHILDS. (L.S.)

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FIG. 1.

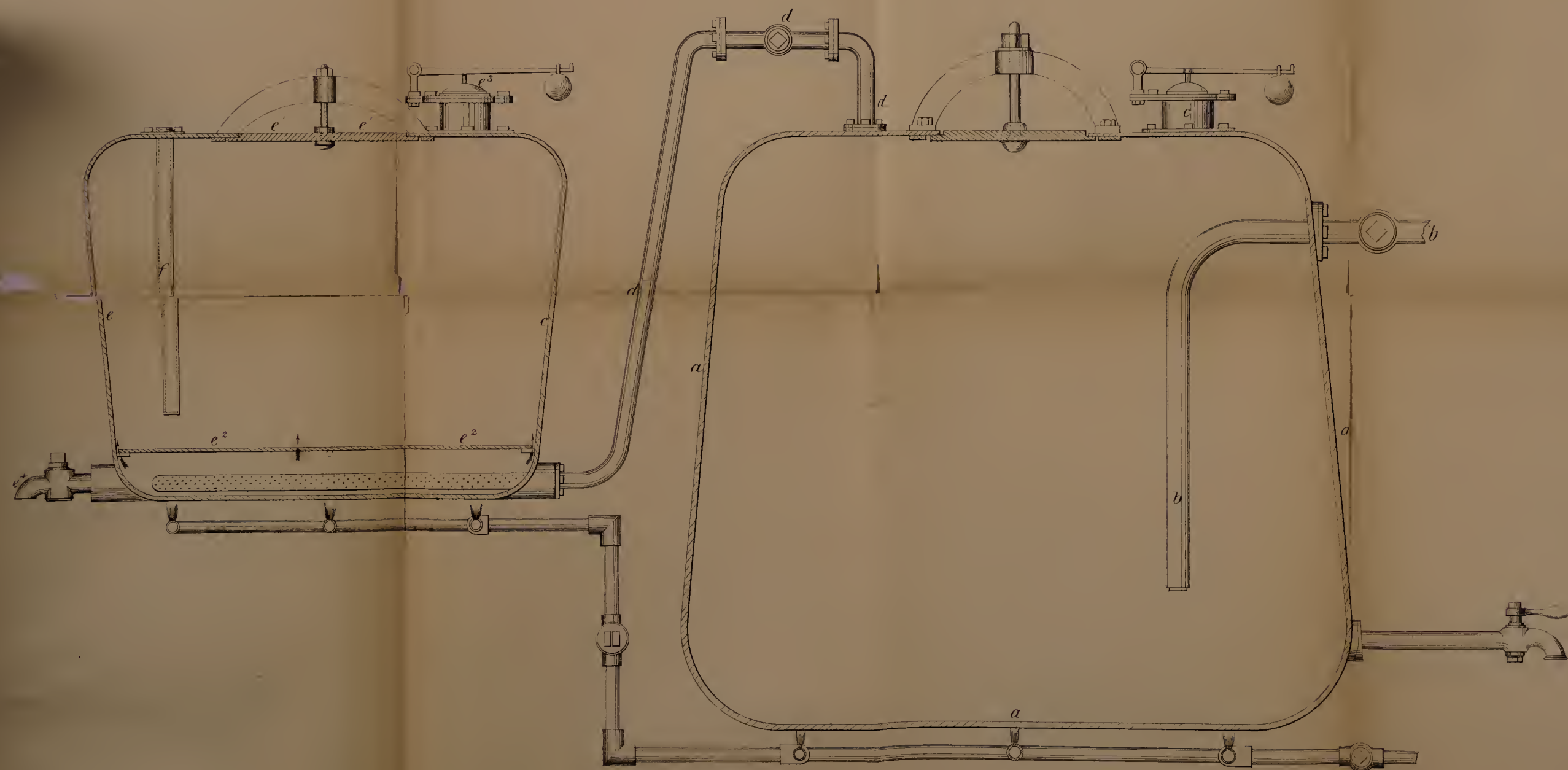


FIG. 2.

